

The Influence of the Number of Mates on Female Fecundity in *Callosobruchus maculatus*

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Introduction

The female bean beetle, *Callosobruchus maculatus*, reproduces by laying eggs on beans. The eggs develop into larvae that feed on the bean before developing into mature beetles, which require neither food nor water to reproduce. Females perform multiple matings with different males. The males have spines on their intromittent organs that harm the female reproductive tract during mating. The severity of the damage increases with the amount of time the female spends copulating. The objective of this research is to assess whether sex ratio, thus frequency of matings, also affects female fecundity and the amount of offspring produced.

Research Question

Will female reproductive success vary by the number of mates?

Hypothesis

It is predicted that as the ratio of males in a population increases, the number of offspring will also increase to an optimum, above which ratio it will decrease.

Methods

Day 0: Treatments were set up according to Figure 1.

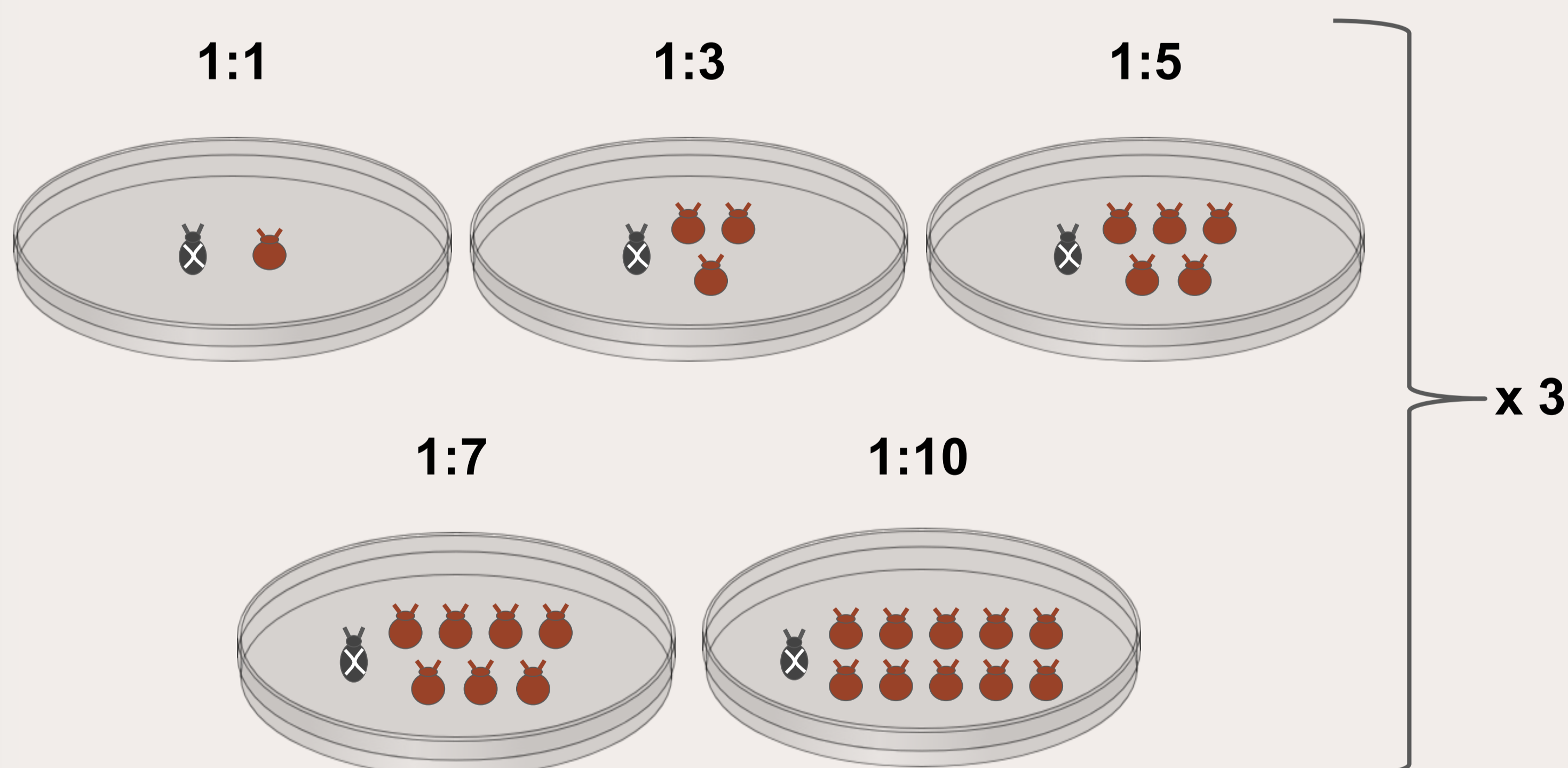
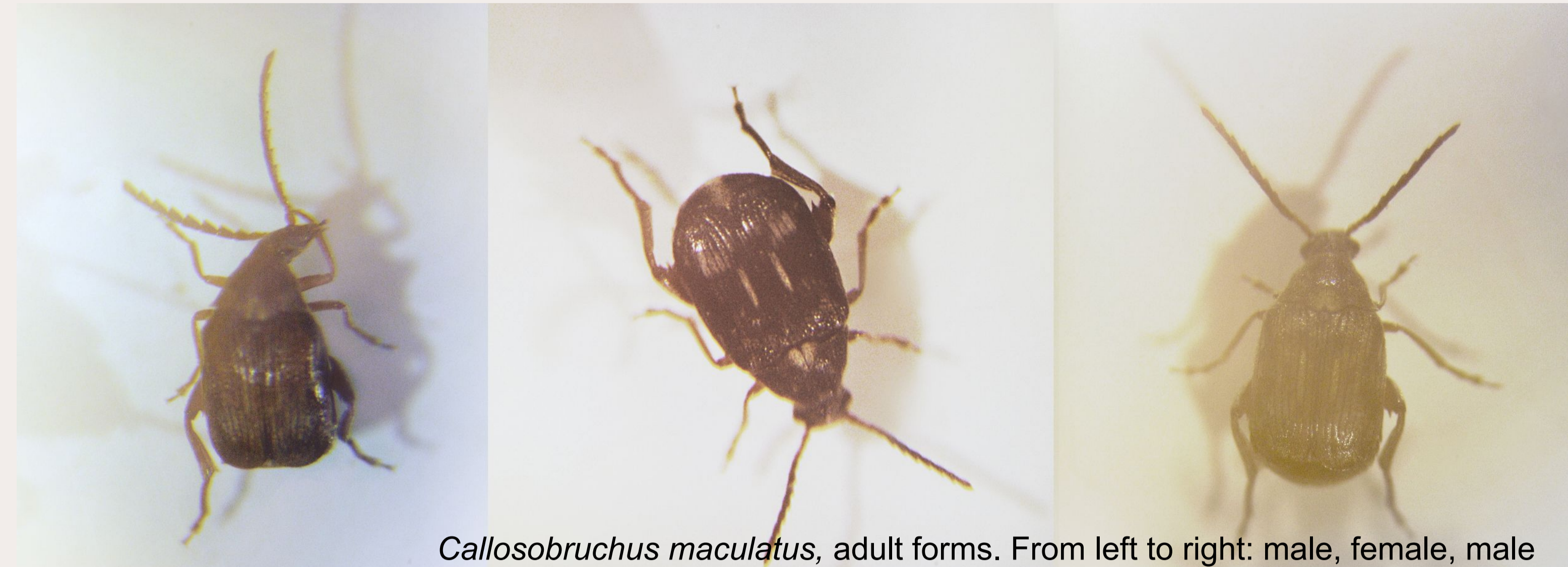


Figure 1: Diagram of the experimental setup. Female beetles are marked by "X" and black color, males are brown. There were three replicates of each treatment. The black eyed pea bean, *Vigna unguiculata* subsp. *unguiculata*, was used as a substrate; 25 beans were put in each dish. The dishes were incubated at 30°C.

Day 14: Total number of eggs in each petri dish were counted

Day 35: Offspring hatched in each petri dish were counted

The variation in egg and offspring count based on number of mates were analyzed by ANOVA, since the data met the assumptions for parametric testing.



Results

No significant effect was found of sex ratio treatment on the number of eggs laid by the female ($F=0.003$, $p=0.995$), or on the number of offspring that hatched during the experiment ($F=0.114$, $p=0.741$).

Conclusion

Our data does not support the hypothesis that the number of mates influences female fecundity in bean beetles.

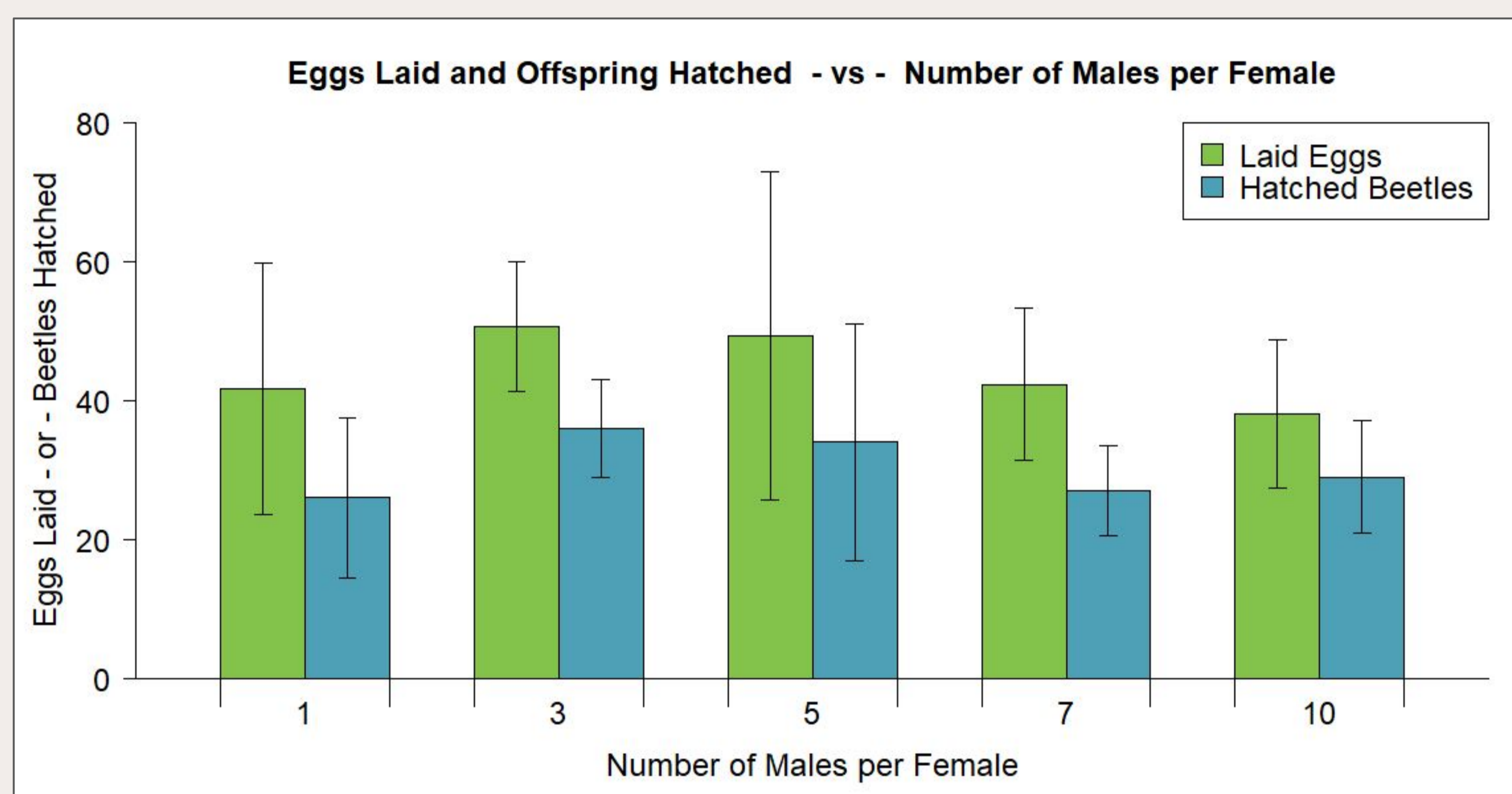


Figure 2: Bars showing the mean number of eggs laid or offspring hatched depending on the number of mates per female with standard error bars. The data shows no significant effect of parental sex ratio treatment on egg or offspring count; variation is mostly within the standard error bars.

Discussion

- The number of replicates was too low, it gave a too diverse dataset. Increasing the number of replicates to a higher number, would be beneficial and would improve the experiment, with the intent of giving a smoother mean and reducing standard error.
- To improve the experiment, the population size of each treatment could be increased to include more than one female. Testing more females would reduce the variability in individual female survival and produce more accurate results.
- Size can influence female fecundity (Eady *et al*, 2000); however, we did not measure all the females to be the same size.

References

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